

## Historic, archived document

Do not assume content reflects current scientific knowledge, policies, or practices.



# ***INTERCOUNTRY COMPETITION IN THE PRODUCTION AND EXPORT OF SOYBEANS***



---

SPEECH BEFORE THE FIRST WORLD SOYBEAN RESEARCH CONFERENCE  
CHAMPAIGN, ILLINOIS, AUGUST 4, 1975

by Alan S. Walter



# INTERCOUNTRY COMPETITION IN THE PRODUCTION AND EXPORT OF SOYBEANS

By

Alan S. Walter\*

The soybean industry has been a rapidly growing and changing industry in the past few decades with the increase in production and export of this commodity unmatched by any other oil crop. 1/ This paper is directed to the competition in the production and export of soybeans. Since soybeans are only one of a number of oil crops produced in large volumes, any intercountry analysis should include the alternative crops. The first of two major theses that I intend to present is that the intercountry competition, when strictly limited to soybeans, has been historically unimportant but is now growing rapidly. The second thesis is that the intercountry competition is somewhat greater when other oil crops are considered, but the major soybean producing countries still remain responsible for a large and growing percentage of the total world supply of oil crops.

## Production of Soybeans

### The 1974 Crop

The 1974 world production of soybeans was nearly 52 million metric tons (1.9 billion bushels), or more than double the 1960 level. 2/ Soybean production is concentrated in a few countries with three nations accounting for 93 percent of the 1974 output (table 1). The United States crop of 33.6 million tons equaled almost two-thirds of the 1974 world production. Brazil, surpassing the People's Republic of China (PRC) for the first time, grew 7.4 million tons (14 percent). The PRC production was 6.75 million tons for 13 percent of the world total. Another 11 countries produced over 100 thousand metric tons each in 1974. Collectively, the top 14 countries produced almost 99 percent of the world crop. World production in 1974 was the second largest in history but down from the previous harvest of over 57 million tons as a result of the unfavorable weather in the United States.

---

\* Agricultural Economist, Commodity Economics Division, Economic Research Service, U.S. Department of Agriculture, Washington, D.C.

1/ Oil crops are loosely defined in this paper to include fats and oils and protein meals of animal, marine, or plant origin. However, synthetic protein substitutes and industrial oils are excluded from consideration.

2/ Unless otherwise stated, all figures are given in metric tons.

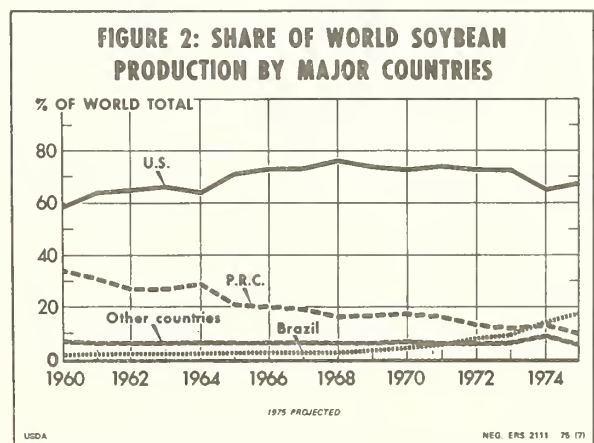
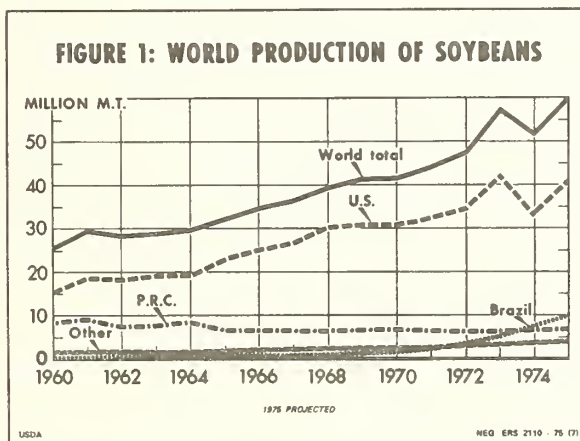
Table 1.--Soybean production by country for 1973 and 1974 <sup>1/</sup>

Country	1974		1973	
	Production	Percent of total	Production	Percent of total
	----- 1,000 metric tons -----			
United States	33,569	65.2	42,108	73.3
Brazil	7,400	14.4	5,000	8.7
China (PRC)	6,750	13.1	6,700	11.7
Indonesia	564	1.1	507	0.9
Argentina	450	0.9	272	0.5
Mexico	420	0.8	510	0.9
USSR	357	0.7	423	0.7
South Korea	319	0.6	257	0.5
Canada	300	0.6	397	0.7
Romania	250	0.5	244	0.4
Paraguay	160	0.3	128	0.2
Japan	133	0.3	118	0.2
Thailand	115	0.2	100	0.2
Colombia	114	0.2	132	0.2
Other Countries	620	1.2	458	0.8
Total	51,521	100.0	57,354	100.0

<sup>1/</sup>The year refers to the period of harvest.

## Trends in Production

The annual growth in world production since 1960 has been both rapid and steady with the quantity harvested increasing over the previous period in all years except 1962 and 1974. The increase in production has come mostly from an expansion of acreage in the United States and Brazil with some increase (about 25 percent) in yield. World production (as shown in Figure 1) has generally followed that of the United States, not surprisingly, since the United States has grown a majority of the crop. The U.S. output increased from 15.1 million tons in 1960 to 42.1 million tons in 1973 but dropped to 33.6 million tons in 1974. The U.S. share increased from 59 percent of the 1960 crop to about 70 percent of world total in the last two years (figure 2). The PRC production has remained relatively stable at about 6.6 million tons since 1965, but her share of the production has decreased from 34 percent of the total in 1960 to 13 percent in 1974. The PRC production has remained relatively stable at about 6.6 million tons since 1965, but her share of the production has decreased from 34 percent of the total in 1960 to 13 percent in 1974.



A remarkable development has been the increase in production by Brazil. The Brazilian harvest did not reach a million metric tons until 1969, but the increases in production have been steady, if not spectacular, since. The 1975 crop yielded about 9.6 million metric tons (353 million bushels), or almost 20 times the level of a decade earlier. The Brazilian production of almost 15 percent of the world total is high enough so that the United States is facing, for the first time, significant competition in the export of soybeans.

The increase in soybean production since 1960 seems remarkable; however, the level of harvest of other crops has not been holding constant in this period, either. The world production of soybeans, even though increasing faster between 1960 and 1973 than for the major grains, is still only a fraction the level of either the wheat, corn or rice crops. The 57 million tons of soybean production in 1973 ranked well behind the 367 million tons of wheat, the 312 million tons of corn, or the 309 million tons of rice harvested (table 2). The area used to produce soybeans is only a small fraction of the land used for the major grains primarily because soybean production is concentrated to a much greater extent within a few countries. The land area used to produce



Table 2.---World area, yield, and production for wheat, corn,  
rice, and soybeans for 1960 and 1973 <sup>1/</sup>

Crop	Area			Yield			Production		
	1960	1973	Percent :increase	1960	1973	Percent :increase	1960	1973	Percent :increase
	<u>Million hectares</u>			<u>Quintals/hectare</u>			<u>Million metric tons</u>		
Wheat	197	218	11	11.3	16.8	49	222	367	65
Corn	99	114	14	19.4	27.5	42	192	312	63
Rice	88	133	51	17.1	23.2	36	151	309	104
Soybeans	21	38	77	12.0	15.2	27	26	57	124

<sup>1/</sup>Percentage increases were calculated from unrounded data.

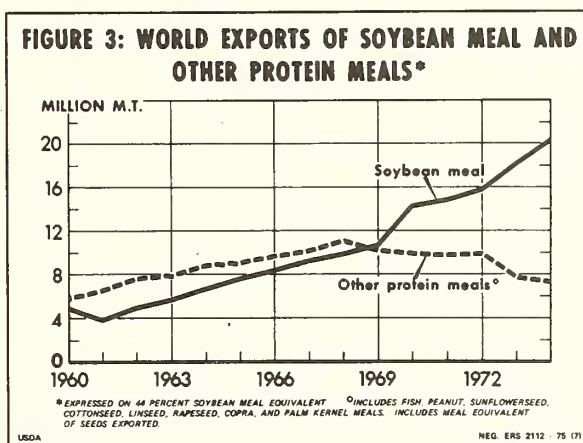


soybeans has grown rapidly since 1960 to 38 million hectares in 1973 but still lags well behind the area devoted to any of the three major grains. Another factor that has held the production of soybeans below that of the grains has been a slower increase in yields than for any of the three major grains.

### Soybean Exports

One of the important reasons for the growth of the soybean industry has been the expansion of demand by importing nations. The major producers, particularly the U.S. and Brazil, have been able to expand their production much faster than domestic consumption. Exports have included large quantities of not only soybeans but also soybean oil and soybean meal.

The magnitude of exports in the soybean industry can best be illustrated by converting some figures to a meal equivalent basis. The 57.4 million tons of soybean production in 1973 converts to the equivalent of 45.6 million tons of soybean meal. Exports in 1973 equaled 18.1 million tons meal equivalent, or about 40 percent of the world crop (figure 3). These exports included approximately 15 million tons of soybeans (11.9 million tons meal equivalent) and in excess of 6 million tons of soybean meal. In comparison, the meal equivalent of exports in 1960 was only about 5 million tons equaling 25 percent of the world soybean crop. Therefore, both the absolute quantity of soybeans exported and the percentage of world soybean production exported have been increasing.



The United States enjoyed a near monopoly position as a source of soybeans for export until the emergence of Brazil in the past few years. As recently as 1970, the United States supplied 92 percent of soybean and soybean meal exports. Brazil has now forced the United States to share these markets by increasing her exports to 20 percent of the total dropping the U.S. share to slightly below 80 percent of the total in 1974. About half of the U.S. crop has been exported (on a meal basis) in recent years with up to 75 percent of the Brazilian harvest sold abroad in some years (also on a meal basis). The PRC, even though the third largest producer, has been exporting only a small part of her crop and has even been a net importer in certain years recently.

## Relative Production of Soybeans and Competing Commodities

Many other protein meals and fats and oils can substitute for soybean meal and oil in some uses. The competing commodities are produced and exported by many countries in all parts of the world. When intercountry competition is extended from the narrow case of soybeans to the more inclusive categories of all oil crops, the dominance of the major soybean producing countries is diminished. Even so, the production of no other oil crop comes close to the level of soybeans harvested on either an oil or a meal basis.

The commodities which substitute for soybean oil and meal have different percentages of oil and protein than soybeans. To compare relative levels of production, it is useful to consider the crops separately on an oil or meal basis recognizing that not all soybeans or other oil crops are actually crushed but may be used for direct human consumption.

### High Protein Meals

The meal equivalent of the production of all oil crops in 1974 was 66.6 million tons with soybeans accounting for 61 percent of the total (figure 4). The combined soybean production of the United States and Brazil accounted for 49 percent of the potential world production of all protein meals. <sup>3/</sup> The 7 million tons meal equivalent of world cottonseed production was second to soybeans, but at 11 percent of the total was still less than one-fifth as important. Fish meal, somewhat irregular in supply over the past few years, provided about 9 percent of the total potential. The meal equivalents of peanut, sunflowerseed, and rapeseed production were significant but much lower than for soybean meal. These figures indicate that even though there are several alternative proteins grown in large volumes, soybeans are more important than the protein equivalent of all other oil crops combined.

### Fats and Oils

Many more substitutes for soybean oil are produced in large volume than for soybean meal. Fats and oils from animal, marine, and plant sources contribute to the overall volume of fats and oils reducing the soybean oil share to 21 percent of the total in 1974 (figure 5). Three of the most important fats and oils, butter, lard, and tallow and greases, are by-products of animal production. The only other vegetable oil besides soybean oil in the top 5 was sunflowerseed oil with 10 percent of the total volume, less than half the level of soybean oil. Soybeans, therefore, retain their position as the most important oil crop on an oil basis but at a much smaller percentage of the total than for soybean meal. This fact is as expected given that a bushel of soybeans includes over four times as much meal as oil.

---

<sup>3/</sup> The distinction between actual and potential production of protein meal is important.

It should be recognized that the quantities and percentages shown in figure 5 are highly dynamic with rapid changes occurring from year to year. Palm oil production, in particular, is rising rapidly with the 1980 level likely to exceed 4 million tons as new trees in Malaysia start producing.

### Production of Oil Crops By Geographic Area

Significant quantities of oil crops are produced in almost all parts of the world, but the production of fats and oils is more dispersed geographically than the production of protein meals. The North American continent produces 49 percent of the world's oil crops on a meal basis (including the portions not ordinarily crushed) but only 29 percent of the fats and oils (tables 3 and 4) <sup>4/</sup>. Asia is the second largest producer of oil crops on a meal basis and third on an oil basis. Europe (including USSR) is third in production on a meal basis and second on an oil basis.

The 10 most important countries accounted for over 83 percent of the potential meal production (table 3) and the top 12 countries accounted for about 70 percent of the fats and oils (table 4). The United States, with 46 percent of the meal and 26 percent of the fats and oils, was the largest producer in 1973 of oil crops on either a protein or a fats and oils basis. The three major soybean producing countries are in the top five countries in the total production of oil crops on both an oil and a meal basis.

### Exports of Competing Commodities

Soybeans are dominant in international trade when compared to other oil crops on either an oil or a meal basis. As shown in figure 6, the exports of soybean meal, including the meal equivalent of soybeans, accounted for 73 percent of the exports of all oil crops on a meal basis. While the exports of soybeans have been steadily increasing since 1961, the exports of competing meals have been decreasing since 1968 (figure 3). Thus, soybean meal is more important to the importing nations than ever before.

The previous indications of greater competition for soybean oil than meal is again applicable when considering exports. Exports of fats and oils in 1974 (including the oil equivalent of seeds) exceeded 12.5 million tons. Soybeans and soybean oil captured only 30 percent of the total exports in 1974 (figure 7), much less than the 73 percent for meal, but up from 22 percent of the total in 1960. The rapidly increasing exports of palm oil placed that commodity into second place among vegetable oils with 11 percent of the total, but still behind tallow and greases when considering all fats and oils.

---

<sup>4/</sup> See the footnotes in tables 3 and 4 for an explanation of how these figures are derived and the commodities included.



Table 3.--Potential production of high protein meals by geographic area, 1973 1/

Continent			Major producer countries		
Continent	Potential production	Percent of world total	Country	Potential production	Percent of world total
	1,000			1,000	
	<u>metric tons</u>			<u>metric tons</u>	
North America	16,982	49	:United States	16,095	46
			:China (PRC)	3,689	11
Asia	7,305	21	:USSR	2,639	8
			:India	2,289	7
Europe (including USSR)			:Brazil	2,118	6
	4,029	12	:Canada	513	1
South America	3,094	9	:Argentina	476	1
			:Mexico	360	1
Africa	1,176	3	:Indonesia	336	1
			:Pakistan	327	1
Other	57	0	:Total of above	28,842	83
			:Other	3,801	11
Unallocated 2/	2,129	6	:Unallocated 2/	2,129	6
Total	34,772	100	: Total	34,772	100

1/ The production that would result if the entire oilseed crops were crushed plus fishmeal production. Included are cottonseed, peanuts, soybeans, sunflowerseed, rapeseed, sesame seed, palm kernels, copra, flaxseed, and fishmeal. Figures are expressed on a raw protein basis.

2/ The unallocated includes the production of countries for which they are minor producers. The relative levels of production by continent or country would not be significantly changed if the unallocated were credited to the proper areas.

Table 4.--Potential production of fats and oils by geographic area, 1973 1/

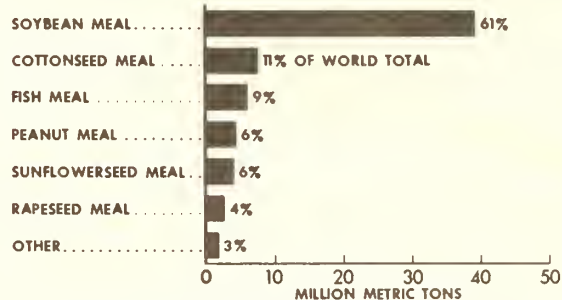
Continent	Continent		Major producer countries			
	Potential production	Percent of world total	Country	Potential production	Percent of world total	
	1,000 metric tons			1,000 metric tons		
North America	14,170	29	:United States	12,658	26	
Europe	11,673	24	:USSR	5,964	12	
Asia	11,464	23	:India	3,689	8	
			:China (PRC)	3,125	6	
Africa	2,970	6	:Brazil	1,588	3	
			:Phillippines	1,142	2	
South America	2,781	6	:Canada	1,126	2	
			:Indonesia	1,112	2	
Other	1,142	2	:Malaysia	1,055	2	
			:France	942	2	
			:Argentina	876	2	
Unallocated 2/	4,760	10	:West Germany	864	2	
			:Total of above	34,141	3/70	
			:Other and unallocated 2/	14,819	30	
Total	48,960	100	:World total	48,960	100	

1/The production that would result if the entire oilseed crops were crushed plus actual production of tung oil, fish oil, palm oil, whale oil, corn oil, olive oil, butter (fat content), lard, and tallow and greases. Oilseeds included are cottonseed, peanuts, soybeans, sunflowerseed, rapeseed, sesame seed, palm kernels, copra, flaxseed, and castor seed.

2/The unallocated includes the production of countries for commodities of which they are minor producers. The relative levels of production by continent or country would not be significantly changed if the unallocated were credited to the proper area.

3/Does not add due to rounding.

**FIGURE 4: WORLD PRODUCTION OF HIGH PROTEIN MEALS, 1974\***

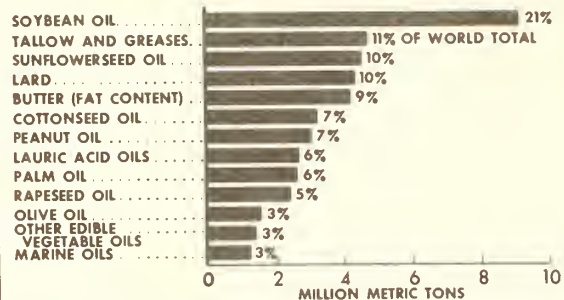


\* ESTIMATED USING ASSUMED EXTRACTION RATES AND CRUSHINGS AND THEREFORE REPRESENTS POTENTIAL RATHER THAN ACTUAL MEAL PRODUCTION EXPRESSED ON A 44% PROTEIN BASIS.

USDA

NEG. ERS 2113 75 (7)

**FIGURE 5: WORLD PRODUCTION OF FATS AND OILS, 1974\***



\* ESTIMATED USING ASSUMED EXTRACTION RATES AND CRUSHINGS AND THEREFORE REPRESENTS POTENTIAL RATHER THAN ACTUAL OIL PRODUCTION. INDUSTRIAL OILS ARE NOT INCLUDED.

USDA

NEG. ERS 2114 75 (7)

### Conclusions

The figures presented indicate the importance of the major soybean producing countries in the world fats and oils and high protein economies. A few countries produce and export most of the soybeans. These same countries, primarily through soybeans, produce a large proportion of the total supply of all oil crops. The two largest soybean producers supply a large share of the oil crops imported. The soybean industry has clearly gained in importance in the past few years, but it has remained concentrated in a few countries. Future events could change the intercountry competition in the soybean industry considerably.

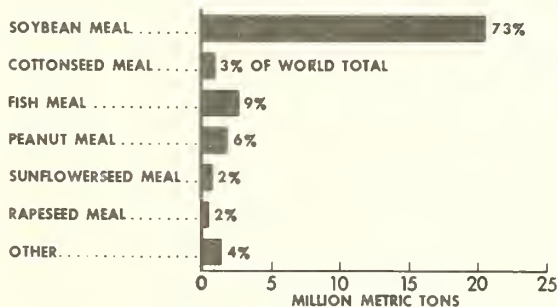
Future intercountry competition in the soybean industry is, to a large extent, dependent upon the economic plans of both the developing and the developed nations and the success of soybean related research. In the past few years we have seen an unprecedented amount of attention given to increasing food production around the world. A relevant question is the extent to which a production capability for soybeans around the world is essential to the provision of an improved diet and higher standard of living for people of the various countries of the world. Another way of stating the same question is to ask how soybeans can fit into the development or growth plans of both the developing and developed nations.

Soybeans can fit into the economic plans of nations in several alternative ways. Some nations may need a greater output of soybeans as a source of feed for developing or improving their livestock industries. Soybeans could also provide protein for direct human consumption. The high quality vegetable oil may also be used for an improved diet in some countries. Some nations may want to grow some (or more) soybeans for export to earn foreign exchange, but not all countries can export.

Soybeans, however, must compete for scarce resources wherever grown. The world supply of both protein meals and fats and oils will affect the viability and profitability of soybean production in competing for the resources. As shown in this paper a number of commodities can substitute for and compete with soybeans. Any changes in production of these commodities will undoubtedly affect the health of the soybean industry. Most of the attention recently has been given to the dire results of a food shortage. Consideration should also be given to the impacts of an abundance of protein feeds or fats and oils on the soybean industry. Neither a shortage or a surplus of the world supply of oil crops is desirable.

It is, in fact, unlikely that all countries now expressing an interest will be able to grow soybeans profitably. This event should only be viewed as the elimination of one option for economic growth in these nations. Such nations may choose to grow other oil crops. They may also opt to specialize in other economic activities, agricultural or otherwise, and to import oil crops. A task for researchers is to realistically evaluate the alternatives available advancing soybeans where applicable but unhesitatingly seeking other options if soybeans are at a comparative disadvantage.

**FIGURE 6: WORLD EXPORTS OF HIGH PROTEIN MEALS, 1974\***

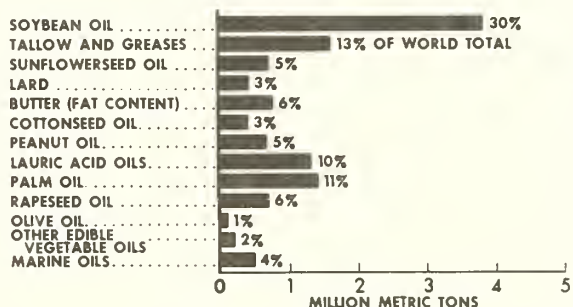


\* INCLUDES THE MEAL (40%) EQUIVALENT OF OILSEEDS EXPORTED.

USDA

NEG. ERS 2116 75 (7)

**FIGURE 7: WORLD EXPORTS OF FATS AND OILS, 1974\***



\* INCLUDES THE OIL EQUIVALENT OF OIL SEEDS EXPORTED.

USDA

NEG. ERS 2116 75 (7)







